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**INFANT WARMER**  
**BN-100**

**CONTROLLED COPY**  
**MANUAL BOOK**

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Please read and keep this instruction in

Order to use the Infant warmer correctly

## 1. Introduction

Infant warmer of model BN-100 adopts anti-explosion micro crystal quartz infrared radiation tube for its radiation source. In its instruction, the radiator can rotate freely in about  $\pm 90$  degree both in counter-clock and direct-clock, the obliquity of the bed can be done continuously and is controllable, there is a X ray film box positioning plate under the bed. Infant warmer of model BN-100 has three operation modes: pre-heat, auto and manual, the indicator shows under which mode the equipment is running, the testing temperature and setting temp is shown independently in the screen, the light for caring the baby uses LEDs lamp, the angle in the direction of both front and back can be controlled. The equipment will alarm with sound and light if failure and exceptional situation comes out when using the infant warmer.

This instruction consists of instruction of usage and techniques, and is suitable for the installation, usage, cleanout, maintenance and analysis and solution of common failure of infant warmer of model BN-100.

Some parts of the products used may not be the same as the ones in the introduction list and circuit diagram, which is because our company put improved parts and circuits into use before putting them into printed introduction.

## 2. Definitions and symbols

### 2.1. Definitions.

#### 2.1.1. Skin temperature sensor.

A sensing device including the link with the equipment intended to measure the infant's skin temperature.

#### 2.1.2. Baby skin temp control.

The skin temp sensor that is stuck to the skin of the baby can automatically change the temp to what the user has set. When the machine operates in this mode, the heat power output changes as the temp of the skin of the baby changes.

#### 2.1.3. Controlled temp.

Temp set in the temp controller.

#### 2.1.4. Skin temp.

The temp in the place of the skin temp sensor on the skin of the baby.

### 2.2. Symbols.



Reset to the throne



APGAR timer start/hold button



To select the mode



Temp, heating power setting



Temp, heating power increase and decrease



Audio paused

	Type BF applied part		Dangerous voltage		High priority alarm
	Power switch On or off		Protective earth (ground)		Attention, consult accompanying
	Low priority alarm		Read Manual Book		Fuse
	Operation instruction		Do Not Dispose		

### 3. Usage and feature

#### 3.1. Usage:

It is suitable for newborn baby's rescuing, nursing and pediatrics operation.

#### 3.2. Feature:

- 3.2.1. The heating source uses anti-explosion quartz infrared heating tube, so it can rise the temp as soon as possible.
- 3.2.2. There are three kinds of control modes of the warmer: pre-heat, auto and manual. It is convenient to be used in different occasions and environments.
- 3.2.3. The control parts is intelligent, it can classify failures and alarm with sound and light.
- 3.2.4. The crib is wide, the obliquity of the bed can be done continuously and is controllable, the Lucite guard can be folded down.
- 3.2.5. The radiant heat source can rotate freely in ±90 degree both in counter-clock and direct-clock, so as to be convenient to shot X rays.
- 3.2.6. Equipped with angle-adjustable LEDs lamp and X ray film box positioning plate.

### 4. Installation (Be careful! Installation needs at least two people)

- 4.1. Please check and count each parts according to the list in the introduction after opening the box, the lamp house of model BN-100 (the middle part), the main body bracket and the baby bed should be packed apart.
- 4.2. Put the spring washer and washer over the foot wheel bolt and install them to the main body bracket, fix it hard with spanner (Be careful! The brake wheels must be installed in the opposite angle).

4.3. Put the I.V pole module into the left slideway and the tray module into the light slideway,

4.4. Install the connection part of lamphouse and column on the support frame with hexagonal bolts to make the infant bed horizontal. (Be careful! Keep the middle part vertical and the radiant source horizontal; otherwise the uniformity of the temp in the bed will be affected).

4.5. Install tray to the side of Colum, and fixed it use Quincunx handle.

4.6. Install infusion hook to the infusion support, after fixed it.

4.7. Use an opener to take down the two diagonal supports of the Lucite guards to make the adjacent two guards insert into the support. Then install the supports. Successively install the four guards. Attention: the Lucite guard with gap fixed in the front, and with scale in two sides

4.8.  
Put

the  
shot  
board  
and  
mattress  
in  
the

middle of the  
baby bed, rotate and insert Lucite guards to correct position around the baby bed.

4.9. Insert the skin sensor to the operation panel.

4.10. Connect the power cord.

1. Wheel	9. M4*12 ripple handle	17. Column
2. Carling of the base	10. Infusion support	18. Mattress
3. Lifting motor	11 .Infusion hook module	19. Bed
4. Vertical support of base	12. Power panel	20.Adjust handle
5. Bed support	13. Lamp house	21. Big end up
6. Guard support	14. Operation panel	22. Drawer
7 Lucite guard	15. Tray	23.Beam of base
8. M8*20 handle	16. Lifting control panel	24.Small end up

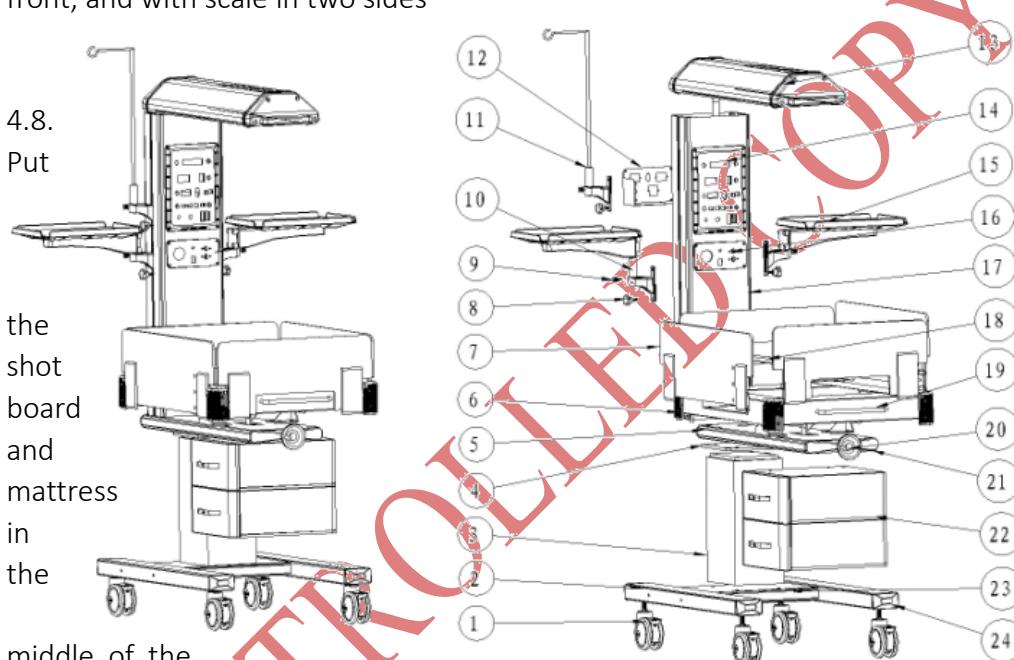


Fig.4-1 Structure

## 5. Operating principle of the radiant warmer

### 5.1. Principle of heat radiation.

When the heater operates, the reflect cover of parabola type radiates evenly the infrared light emitted by the heat source to the baby mattress or the skin of the baby, so as to play part in the function of heating.

### 5.2. Principle of circuit (See Fig.5-1)

DC voltage: 5V for one-chip computer and integrated circuit, 9V for relay and buzzer.

6V built in battery: alarm power while the main power is cut off

Heating controller: includes photoelectric coupling integrated circuit, BTA, 800W heat radiation tube.

Alarm: consist of one buzzer.

### 5.3. Temp control and principal of display (See Fig.5-2).

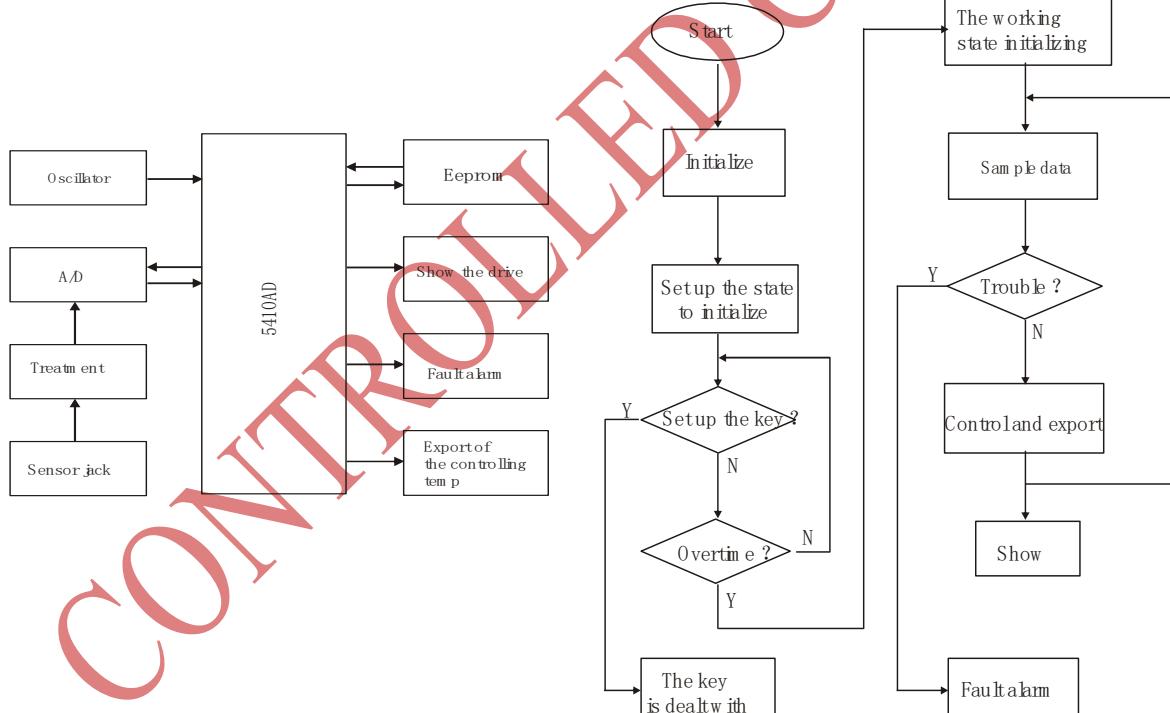


Fig.5-1 hardware principle

Fig.5-2 The procedure block diagram

5.4. Parameter revision method (user don't revise by yourself without experimental condition).

#### 5.4.1. Temperature revision.

When the warmer in operating under "auto" mode, press "set" button all along till the temp display screen shows "\_\_\_", first character is twinkling, press "increase" button once, the screen shows "1\_\_". Press "decrease" button once, second character is twinkling, press "increase" twice; the screen shows "12\_\_". Press "decrease" button, third character is twinkling, press "increase" three times, the screen shows "123", then press "set" button, the system into main menu: the temp set display screen shows "PA.-".

Press "increase" button once, temp set display screen shows "PA.1". Then press "set" button, the screen shows "0" ("0": to give up; "1": to determine), press "increase" button, it shows "1". Press "set" button, now system go into "temp revision" submenu.

Temp display screen shows Pxx (the initial value is P2.0), under this state user can presses the "increase" or "decrease" button to revise the deviation of the temp displayed by the skin temp and the temp in the standard thermometer (the revise range:  $\pm 2^{\circ}\text{C}$ ). Then press "set" button, now the temp display screen shows Uxx (the initial value is U1.0), under this state revision of temp value for over-temp alarm can be made (the revise range:  $\pm 1^{\circ}\text{C}$ ).

After finishing operation above press "set" button twice, the equipment goes back to normal working state.

Be careful:

The skin temp sensor's head and the standard thermometer must be put under the same temp ( $36^{\circ}\text{C}$ - $37^{\circ}\text{C}$ ), then find out the deviation and revise after it is steady.

## 6. Main technical parameter

6.1. Power supply: AC 220 ~ 240V, 50 Hz

6.2. Power input:  $\pm 750\text{ W}$

6.3. Normal working condition:

- a. Environment temperature:  $20^{\circ}\text{C} \sim 30^{\circ}\text{C}$ ;
- b. Relative humidity: 30% ~ 75%;
- c. Atmospheric pressure: 500 ~ 1060hPa;
- d. Air velocity:  $<0.3\text{m/s}$

6.4. Temperature control range:  $32^{\circ}\text{C} \sim 38^{\circ}\text{C}$

6.5. Precision of temperature control:  $\pm 1^{\circ}\text{C}$

6.6. Functional alarm:

6.6.1. Over-temp:  $39^{\circ}\text{C}$

The secondary over temp to shut off power:  $40^{\circ}\text{C}$  (cut off the heating power, alarm with sound and light)

- 6.6.2. Deviation alarm: When the temp goes steady and the deviation reaches  $\pm 1^{\circ}\text{C}$  ( $+1^{\circ}\text{C}$ , the heating power will be shut off), alarm with sound and light.
- 6.6.3. Sensor alarm: When the skin temp sensor is in short circuit or open circuit state, shut off the heating power, alarm with sound and light; the sensor overruns the radiation area and temp deviation reaches to  $-1^{\circ}\text{C}$  for about one minute, the machine will alarm with sound and light automatically and keep certain power to heat up.
- 6.6.4. Power failure alarm: When the power breaks off, alarm with sound and light.
- 6.7. Bed temperature uniformity:  $\leq 2^{\circ}\text{C}$
- 6.8. Precision skin temperature sensor:  $\pm 0.3^{\circ}\text{C}$
- 6.9. Temperature time increase:  $\leq 45\text{min}$
- 6.10 Bed angle setting  $\pm 10^{\circ}$  tras
- 6.11 Mattress dimensions: 665 mm(L) x 540 mm(W) x 36mm (H)
- 6.12 Heater head turning radius:  $\pm 90^{\circ}$
- 6.13 Jarak sumber panas ke matras: 80 cm
- 6.14 Timer setting for APGAR:  $\leq 24$  hours
- 6.15 Electrical height adjustment: 0 ~ 20 cm
- 6.16 Unit dimensions: 920 mm(L) x 880 mm(W) x 1690 mm(H)
- 6.17 Net weight: 74 kg
- 6.18 Transportation and storage
- a. Environment temp:  $-10^{\circ}\text{C} \sim +70^{\circ}\text{C}$
  - b. Relative humidity range:  $\leq 80\%$
  - c. Atmospheric pressure range: 500~1060hPa

## 7. Functions instruction

**7.1. Radiator:** Provide infrared radiation for baby, can increase or decrease radiation power according to the control situation, and can rotate in  $\pm 90^{\circ}$  around the axis if necessary so as to shot X rays. Be careful when use this function: try to shorten the time of removing the radiant source as not to influence warming the baby. The quartz infrared tube in the radiator needs to be replaced if used over 2000 hours.

**7.2. Tray:** for placement of nursing articles, the heaviest strength is 20N.

**7.3. Baby bed:** to bare the weight of the baby safely, the heaviest strength is 100N, the baby bed can incline continually in  $\pm 10^{\circ}$  according to nursing necessity.

**7.4. X ray cassette tray:** on which the X ray film can be put, can operate X rays shot diagnosis when necessary.

**7.5. Foot wheels:** be convenient to move the equipment, orientation can be made at any time by using the two brake wheels.

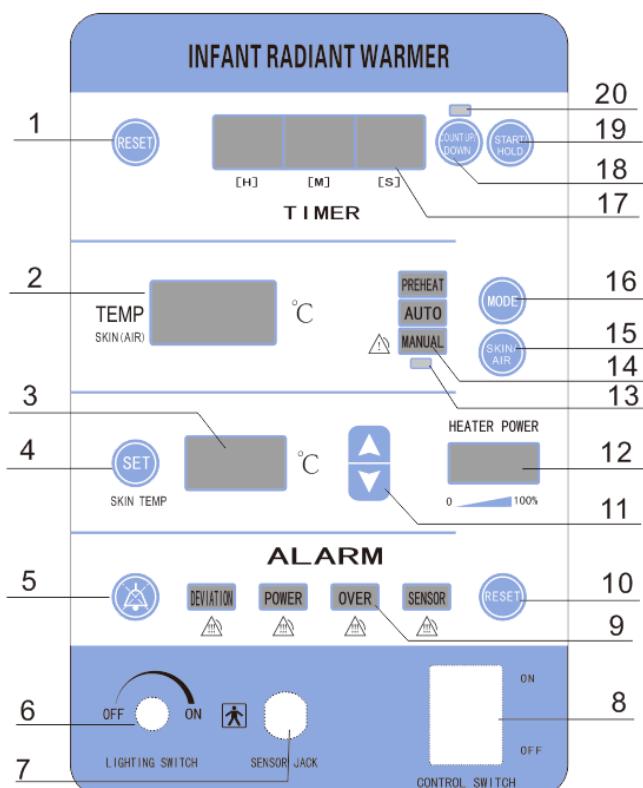
**7.6. Infusion shelf:** to hang infusion bottle when treating the baby, the heaviest strength is 20N.

**7.7. Lucite guard:** prevent the baby from slipping out of the bed.

**7.8. Functions of the panel button:**

- 7.8.1. APGAR timer: press “start / hold” button to start, press it again to stop.
- 7.8.2. APGAR “reset” button: press “reset” button and the APGAR timer goes back to “0”.
- 7.8.3. Mode button: tolerate to the state of “preheat” when starting the machine, press “mode” button to enter the “auto” mode, to press it again to enter the “manual” mode, press it once again to go back to “preheat” mode.
- 7.8.4. Temp “set” button: to set the temp by pressing this button.
- 7.8.5. “Increasing and decreasing” button: to set the controlled temp (in auto mode) or to set the heating power (in manual mode).
- 7.8.6. “Alarm audio paused” button: when the equipment alarms with sound and light because of temp deviation and sensor failure, press this button to remove the sound alarm.
- 7.8.7. Failure alarm “reset” button: press this button to reset the failure alarm and the controlling mode goes back to “preheat” mode.
- 7.8.8. “Lighting switch” button: to open or shut off the light (option).

## 7.9 The functions of operation panel



1. TIMER reset button
2. Skin (air) temp display
3. Set skin temp display
4. Skin temp set button
5. Audio paused button
6. Lighting switch
7. SENSOR JACK
8. CONTROL SWITCH
9. SENSOR
10. RESET
11. Increasing and decreasing button
12. Heating power display
13. Air temp indicator light
14. Mode indicator
15. Skin/air temp changing button
16. MODE

- |                          |   |
|--------------------------|---|
| 7. Skin temp sensor jack | 17. Time display (hour, min, second)    |
| 8. Control switch        | 18. Timer count up/down changing button |
| 9. Failure alarm display | 19. Timer start and hold button         |
| 10. RESET button         | 20. Count down time indicator light     |

## 7.10 Alarm system

### 7.10.1 Summary

For offer a temp well warmer for patient, during the use and maintain this equipment, if have failure will inform user in time, make them take effect action, reduce or avoid the damage to patient, equipment have 5 alarm state (chart 7-1) as follows, divide into physiology alarm condition and technology alarm condition:

- a) physiology alarm state have : skin temp deviation alarm
- b) Technology alarm state have: power failure alarm, sensor alarm, over temp alarm, manual over time alarm.

**Chart 7-1**

Alarm state	State description	note
Power outage alarm	When equipment power is switch on, if have power outage, system will have at least 10 minutes audible and visual alarm, or still to power is normal.	Built-in battery alarm, press "audio paused" can't pause sound alarm
Skin temp deviation alarm	In skin temp control mode, skin temp sensor on the top of baby belly, set temp almost same with baby skin temp, after temp stable, if the test temp deviate more than $\pm 1^{\circ}\text{C}$ compare with set temp value. Equipment will alarm with audio and visual, reminding the user take action. If deviate $+1^{\circ}\text{C}$ , equipment will cut off heat power automate.	
Sensor alarm	Skin temp sensor appear open circuit or short circuit, equipment have audible and visual alarm, and cut off heating power.	
Manual mode	In manual mode, audio and visual alarm start at 12 minutes, till this mode end, remind user take attention.	If press "audio paused" can pause audio pause, it can self-recovery in 10 minutes; visual alarm can't paused.
Over temp alarm	No matter the equipment in the normal state or single fault state, when skin temp reach $39^{\circ}\text{C}$ , equipment will have audible and visual alarm ,when reach $40^{\circ}\text{C}$ ,will have audible and visual alarm and cut off heating power.	

Alarm state confirm summary	1.when equipment have blew alarm, and the "power failure" red indication light bright on the control plate, other digital display and indication all not bright, equipment into "power outage" alarm state.	Equipment alarm state delay 1 second, operator at front of equipment in 1 meter
	2. when equipment have "beeps.." sound alarm, control plate except "sensor red indicator bright, other alarm indicator all not bright, shows into "skin sensor failure " state.	Equipment alarm state delay 1 second, operator at front of equipment in 1 meter
	3. When equipment have "beeps.." sound alarm, control plate except "over temperature" red indicator bright, other alarm indicator all not bright, skin temp display window shows high real temp value, equipment into "over temp" state.	Equipment alarm state delay 2 second, operator at front of equipment in 1 meter
	4. when equipment have "beeps" sound alarm, control plate except "deviation" red indicator bright, other alarm indicator all not bright, equipment into "deviation" alarm state. If display temp more than set temp is positive deviation, otherwise is negative deviation.	Equipment alarm state delay 1.5 second, operator at front of equipment in 1 meter
	5.When equipment have "beeps.." sound alarm, control plate except "manual mode" green indicator bright, other alarm indicator all not bright, skin temp set display window no temp value, equipment into "manual mode" state.	Equipment alarm state delay 1 second, audio alarm delay 12 minutes, operator at front of equipment in 1 meter

#### 7.10.2 The time of check the alarm system normal or not

When reinstallation equipment after disassembly parts for cleanout or maintain every time, user should inspected alarm system, to see if normal or not, inspection way please reference part 8.

#### 7.10.3 The priority of alarm state.

According to the standard and requirement of "IEC60601-1-8", alarm system of the equipment except must have visual alarm, need audio alarm too, to ensure patient safety.

Priority of equipment alarm state and parameters (Chart 7-2)

Chart 7-2

Alarm state	preferential	Visual alarm			Audio alarm		
		color	Flash rate (Hz)	Duty cycle	Pulse count of a pulse crowd (Hz)	Time of a pulse crowd (s)	Interval of pulse crowd

Skin temp deviation	high	red	2Hz	40%	10	3.8	5s
Power failure	high	red	Bright steady	100%	--	--	blew
Over temp	high	red	2Hz	40%	10	3.8	5s
skin temp sensor failure	high	red	2 Hz	40%	10	3.8	5s
Manual mode	low	green	Bright steady	100%	2	0.6	12min

## 8. Examination of the functions.

After installing the equipment and reinstalling by disassembling the machine parts as washing or maintaining, examination of functions must be taken so as to make the warmer work normally.

### 8.1. Examination of alarm for power failure.

Turn on the power switch before inserting the power plug into the AC power socket, the equipment should alarm with sound and light as "power failure"; turn off the power switch and the alarm will be removed(Be careful: this operation can't last too long so as not to waste the battery).

### 8.2. Examination of the mode conversion.

After starting the machine, the mode automatically enters "preheat"("preheat" mode indicator is on), the warmer will heat according to the preset heating program; press "mode" button and the warmer enters "auto" mode ("auto" mode indicator is on), the warmer will heat in constant temp according to the set temp; press the "mode" button again, the warmer enters "manual" mode ("manual" mode indicator is on), the warmer will heat according to the heating power.

### 8.3. Examination of the skin temp sensor alarm.

Pull off the skin temp sensor, under any mode, the equipment will alarm with sound and light; insert the skin temp sensor again, the warmer goes back to normal working state (Be careful: sound alarm will not appear when pulling off the skin temp sensor after having pressed "alarm audio paused" button).

### 8.4. Examination of deviation alarm.

Set the temp to 37°C, after the warmer reaches to constant temp, make the skin temp sensor close to the heater gradually and if the indicating temp reaches 38°C, deviation alarm will appear; make the skin temp sensor head far away from the radiation area gradually and if the indicating temp reaches 36°C, deviation alarm will appear.

### 8.5. Examination of over temp alarm.

Set the temp to 37°C, after the warmer reaches to constant temp, move the skin temp sensor close to the heater gradually, over temp alarm should appear when the indicating temp rises to 39°C (sound alarm can be removed by pressing

alarm audio paused button); when the temp rises to 40°C, the alarm will sound continually(now the alarm audio paused button is out of use),cut off the heating power at the same time. Turn off the power and restart the machine after the temp returns to normal state.

#### **8.6. Examination of the protection of the skin temp sensor.**

Set the temp to 36°C, after the warmer reaches to constant temp, remove the skin temp sensor from the radiation area of the baby's bed, deviation alarm will appear when the indicating temp is below 35°C, and the heater works in its full power; If the indicating temp falls continually, after a while, sensor failure alarm will appear and keep the heater power at around 30%.

### **9. Usage of the equipment**

#### **9.1. Preparation before operating.**

9.1.1 Clean and disinfect the equipment, examine the functions.

9.1.2 Lock the brake wheels of the warmer tight so as to prevent it from moving while in use.

9.1.3 Insert the skin temp sensor into the skin temp sensor jack.

9.1.4 Insert one end of the power wire into the power input jack behind the warmer, insert the other end into AC 220, 50/60Hz power socket. (Be careful: the grounding of the power socket must be tight and reliable).

#### **9.2 Operating method**

##### **9.2.1 Starting the machine**

9.2.1.1 Turn on the power switch of the warmer and the equipment enters "preheat" work state.

9.2.1.2 When use short-time bed temp and baby skin temp to control the heating, user can press "mode" button and choose "auto" mode;(Be careful: for short-time bed temp control, the sensor should be placed in the middle of the mattress without anything sheltering the baby's skin. For baby skin temp control, the sensor must be stuck on the top place of the baby's abdomen).

9.2.1.3 Press "set" button to change the controlling temp: when the temp display screen glistens, press "increase" or "decrease" button to set the temp, it will turn back automatically to normal state in 5 seconds after setting.

9.2.1.4 Press "mode" button and choose " manual" mode; to press "increase" or "decrease" button to change manual controlling power; there will be remind with sound and light in about 10 minutes under the manual operating mode.

9.2.1.5 Press "alarm paused" button to remove sound alarm if the equipment shows alarm (except power break off and second-over temp alarm).

##### **9.2.1.6 The timer operation**

a. The timer display "00000" when the machine turns on. Press "start/hold" button to start, and press it again to stop; press it once again to continue. When the timer counts to 50'', 4'50'', 9'50'', the equipment will give remind sound less than 15 seconds. Press "reset" button to revert to "0".

b. Count down operation: Press " count Up/down " button, the indicator light is illuminated and displayed "--0000", press up or down arrow button to set up

hours (maximum value 12); Press reset button, display “00--00”, then press up or down arrow button to set up minutes; Press reset button again, shows “0000--”, and press up or down arrow button to set up seconds. After complete the setting, press star/stop button to start Count Down. Press start/hold button could pause or continue. The timer shows “00000” and alarm when finished. Alarm will last no less than 30 seconds and could be stopped by pressing “reset” button or audio paused button.

#### 9.2.1.7 Air temperature observation

If need to check air temperature, press skin/air button, the indication light is illuminated and display the air temperature. Press skin/air button once again or keep it without any action for 20 seconds, indication light is went out and system reverts to skin temperature.

#### 9.2.2 Observe lighting

Turn on the lighting switch by rotating it in clockwise, the LEDs lamp starts to illuminate. Turning in clockwise direction can increase brightness and turning in counterclockwise direction can reduce brightness. The illumination angle can be adjusted in the front and back direction manually.

#### 9.2.3 Obliquity of the bed

Turn the hand wheel with the handle at the bed, choose the obliquity of the bed to meet clinic requirements.

#### 9.2.4 X ray cassette tray

Folded down the side Lucite guard and then the X ray cassette tray can be taken out.

#### 9.2.5 Rotation of the radiator

Rotate the radiator in  $\pm 90$  in both counter-clock and direct-clock according to the clinic shot requirements.

#### 9.2.6 Lucite guard

Lucite guards shall prevent the infant from falling off the bed. When the machine is working, be sure all the rotating shaft and block of guard support are in good condition. If folded one of the guard support, lift it and then turn downwards; vice versa.

9.2.7 The transformer of the warmer is equipped with fuse of 1AL in model F, which is used to protect the inner circuit of the temp controller. If the fuse burns out, the same type must replace it; otherwise it will affect the normal work of the equipment.

9.2.8 While examine the functions; in time replacement of battery must be made if the power break off alarm is too low. Open the back baffle of the controller crust, and the replacement can be made (Be careful: the connection between the cathode and the anticathode of the battery).

### 10. Notice

10.1 Read this Instruction carefully before using this equipment, paramedic who uses this equipment must be trained and use under the guide of eligible doctor who is familiar with the function and usage of the equipment.

- 10.2 Only after setting the temp after starting the machine and preheating for 45 minutes, then the warmer can be used.
- 10.3 Do not turn on the power switch for long time if the power has not been switched on, or else it will cause power break off alarm and waste the battery.
- 10.4 Long time of radiation will cause dehydration of the baby, please transfuse the baby or put some water around the bed or use waterproof tent to increase the humidity.
- 10.5 Lock the foot brake tight to prevent it from moving.
- 10.6 When the machine is working, be sure all the axis of rotation and block of guard support are in good condition, and the Lucite guard is in right place.
- 10.7 Do not use the equipment while it is working abnormally, maintenance must be made and made by professional.
- 10.8 This warmer uses fuses in 5AL and 1AL of model F, pull off the power plug before replacing the fuse.
- 10.9 The controller circuit of the warmer is connected to a relay; the relay will make less electromagnetic radiation. Well grounding and shielding is recommended while using other assistant equipment.
- 10.10 Organic solvent, such as alcohol, cannot be used to clean Lucite guard, and also it cannot be put under the direct radiation of ultraviolet.
- 10.11 To avoid making danger to sufferer while in cure; operator cannot leave if the guard is taken off.
- 10.12 The Lucite guard, baby bed and mattress must be cleaned in time after using the warmer.
- 10.13 Assure the lamp module surface is clean before use.
- 10.14 Prolonged operation will cause the unit surface hot; so don't touch it as possible as you can.
- 10.15 Never block the heat vent of lamp module.
- 10.16 No modification of this equipment is allowed.

## 11. Warning

- 11.1 This warmer has not equipped with oxygen equipment; user wants to carry on oxygen therapy, please do notice.
- 11.1.1 Oxygen analysis instrument must be equipped when carrying on oxygen therapy by yourself, please operate according to oxygen analysis instructions or files of the same type.
- 11.1.2 Fire danger will rise while oxygen therapy is carrying on; at this time any assistant equipment that will cause spark cannot be put on the warmer.
- 11.1.3 Inflammable solvent, such as ether and alcohol, cannot be left on the bed when oxygen therapy will be carried on.
- 11.2 AC power must adopt single-phase of three wires, and the grounding must be reliable. The warmer should be placed in clean site and place with small changes in temp and humidity.
- 11.3 Avoid direct sunshine and keep the bed far away from radiation to prevent the

temp of the warmer from rising to dangerous degree.

11.4 The equipment is in class 1, type BF applied part, so additional electrified equipment connected to the baby must ground reliably or to be insulated.

11.5 Skin temp sensor must be stuck to the top of the baby's abdomen correctly, check if there are things on the baby that can absorb or reflect heat, skin temp sensor cannot be used as rectum thermometer.

11.6 When the warmer works in auto controlled mode, the skin temp sensor must be put in the controlled temp area; the skin temp sensor must be stuck to the top of the baby's abdomen tight, and prevent it from falling off, when it works in baby controlled mode (Be careful: the skin temp sensor should not be put out of the bed to avoid after effect caused by uncontrollable temp.)

11.7 The skin temp sensor must be inserted or pulled out correctly by handling the plug; ways by pulling the wire is strictly prohibited.

11.8 The temp of the heater is very high when the warmer is in work; touch the heater or radiator cover after 45 minutes turning off the machine to avoid scald.

11.9 The temp of the warmer is very high when it is working, so it is not suitable to use inflammable anaesthesia gas or other inflammable object to avoid bringing out of danger.

11.10 Although there is a temp controller monitoring and controlling the temp of the baby independently while the warmer is in work, operator cannot leave, avoiding leaving the baby at freestate without nobody's caring if failure comes out.

11.11 Turn off the machine immediately if certain function of the warmer loses or fails, call professionals to maintain it.

11.12 This equipment service life is 8 years, when service life is over should scrap the equipment, related products scrap should be in conformity with law.

## 12. Cleanout and maintenance

### 12.1 Cleanout

After caring or rescuing a baby, the warmer must be cleaned、sterilized、disinfected (at least once a week) fully. The parts and groupware will reach the anticipative effect after been cleaned disassembly, it is good to clean them by soap, and some disinfectant solvent is ok too; clean them by aseptic water and dry them soon, then install.

#### 12.1.1 Disassemble the parts.

12.1.1.1 Disassemble the guards: unload the two guard supports diagonally of infant bed, the four guards around can be taken off.

12.1.1.2 Take out the mattress and take off the cover.

12.1.1.3 Draw the X ray film box positioning plate from the side.

#### 12.1.2 Cleanout of the parts

Use registered cleanser; the bed should be empty when do cleaning, and clean after wiping off all solids and pollutions from the disassembled parts.

##### 12.1.2.1 Cleanout of the skin temp sensor

Clean the surface with disinfectant solvent (Be careful: Do not put the skin

temp sensor into the solvent). Clean it with clean cloth or let it dry by vaporizing.

12.1.2.2 Cleanout of guard and X ray **cassette tray**: disinfect and clean with disinfectant solvent in proper quantum, wipe the inside out and out after cleanout (including the concave place). Be careful: Do not clean the guard with organic solvent, such as alcohol; do not put it under direct radiation of ultraviolet.

12.1.2.3 Cleanout of mattress and cover: brush with cleanser, rinse with clean water and then air to dry.

12.1.2.4 Cleanout the disassembled and cleaned main body: cleanout all of the surfaces and corners of the equipment out and out with disinfectant cleanser, and then dry them with clean cloth.

12.1.3 Assemble.

After the main body and the parts are cleaned and dry, install in the order opposite to the way of disassembling them. Do not use lube, alcohol or other objects to lubricate the surface when install. Check whether the baffle is fixed tight and don't leave any inflammable objects after installation.

## 12.2 Maintenance (Operated by professional, the power plug must be pulled off).

12.2.1 Replacement of battery



If the equipment hasn't been used over six months, start the machine to make it charge automatically at least 6 hours, insuring the sufficiency of power to alarm for power failure.

The battery could be changed by authorized person only!

In the process of examining the alarm of power failure, if the alarm cannot sound, or the sound is too small, charge the battery up or change a new one in time in case that the battery liquid flow out and damage the parts of the equipment. If the battery liquid flowed out, must wash it cleanly with the cleanser, so as not to corrode the equipment. While changing the battery, pull out the plug of supply power firstly, and unload the screws of the operation panel. Demount the rechargeable battery which lays in the PCB board with electric iron and solder a new one onto the circuit board. Collect them together and dispose them to avoid environment polluting. Don't abandon the changed batteries at will.

12.2.2 Replacement of the power fuse

Pull off the power cord, open the fuse socket of the power socket in the back of the warmer, replace it with the same type of fuse(F 5AL250V 5×20). The fuse of the transformer is also in the back of the equipment, replace it with the same type of fuse (F 1AL250V 5×20) and then the replacement is done.

12.2.3 Replacement of the LEDs of lighting

Take off the shield window which lays outside of the LEDs lamp, and then the replacement of the lamp can be done.

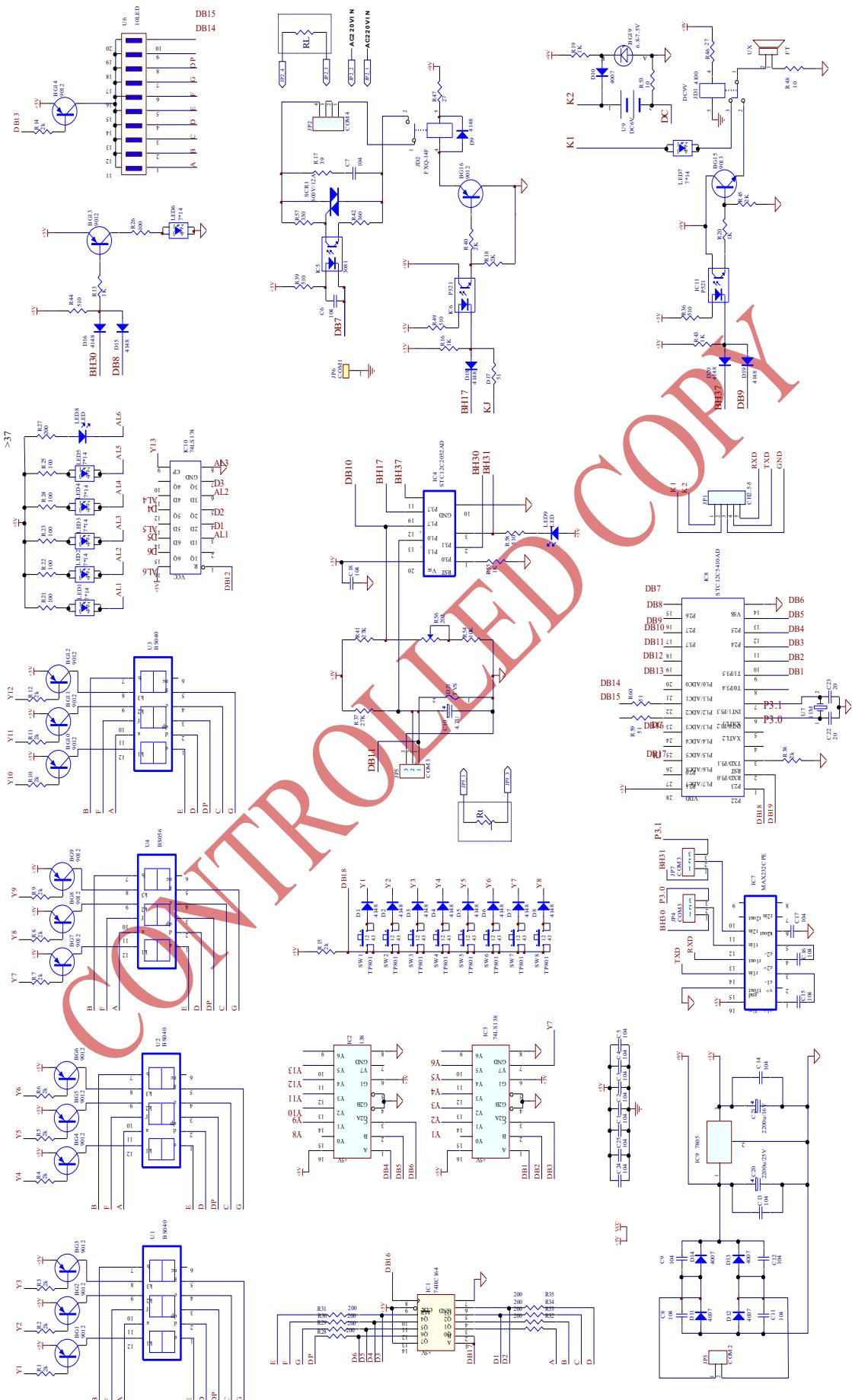
12.2.4 Replacement of the anti-explosion quartz heat tube

Unprofessional is not allowed to open the top cover of the radiant source, avoid vibration and electric shock.

Open the top cover of the radiant source, take off the power wire of the two sides of quartz heat tube, then disassemble the spring and cover of the fixed heat tube, take out the heat tube, install in the way of the opposite order.

### 13. Solution of common failure

Phenomenon	Cause analysis	Solution
Sensor alarm	<ul style="list-style-type: none"> <li>a. The skin temp sensor has not been inserted.</li> <li>b. The plug of the skin temp sensor falls off or bad tangency.</li> <li>c. Skin temp sensor failure.</li> </ul>	<ul style="list-style-type: none"> <li>a. Insert the skin temp sensor.</li> <li>b. Check the plug and the connection.</li> <li>c. Replace the skin temp sensor.</li> </ul>
Over temp alarm	<ul style="list-style-type: none"> <li>a. Skin temp sensor has not been laid well.</li> <li>b. BTA failure.</li> </ul>	<ul style="list-style-type: none"> <li>a. Lay the skin temp sensor well.</li> <li>b. Replace the BTA.</li> </ul>
Deviation alarm	<ul style="list-style-type: none"> <li>a. The skin temp sensor has not been put in the center of the bed or there are some coverings above.</li> <li>b. Great change of the environment temp.</li> <li>c. Heat source beside the machine.</li> </ul>	<ul style="list-style-type: none"> <li>a. Lay the skin temp sensor well.</li> <li>b. Stabilize the environment temp.</li> <li>c. Keep the machine away from the heat source.</li> </ul>
Power break off alarm	<ul style="list-style-type: none"> <li>a. The power plug has not been inserted well.</li> <li>b. No power support.</li> <li>c. The fuse has burnt out.</li> </ul>	<ul style="list-style-type: none"> <li>a. Check if the power plug has inserted.</li> <li>b. Turn off the power.</li> <li>c. Replace the fuse with the same type.</li> </ul>
Panel button failure	Panel button failure.	Replace the panel.
LED lamp doesn't light.	<ul style="list-style-type: none"> <li>a. Bad tangency of the lamp socket.</li> <li>b. Wires of the lamp socket or the power socket have not been inserted or loose.</li> <li>c. An adapter is bad.</li> <li>d. Failure of the LED lamp.</li> </ul>	<ul style="list-style-type: none"> <li>a. Check the lamp socket.</li> <li>b. Insert the power wire tight.</li> <li>c. Replace the adapter.</li> <li>d. Replace the LED lamp.</li> </ul>
Temp doesn't rise up.	<ul style="list-style-type: none"> <li>a. Controller failure.</li> <li>b. Power wire of the heater tube falls off.</li> <li>c. Failure of the heater tube.</li> </ul>	<ul style="list-style-type: none"> <li>a. Check the controller.</li> <li>b. Fix the power wire tight.</li> <li>c. Replace the heat tube.</li> </ul>



## List of electrical parts in I.R.W

No	Name	Specification	No	Name	Specification
1	BX1 BX2	F5AL	32	RL	800W
2	BX3	F 1AL	33	SCR1	600V/12A
3	B	9V/0.8A	34	C21	2200u/16V
4	K	250V/10A	35	C20	2200u/25V
5	R16 R17	1K	36	IC5	3081
6	R1~R20	1K	37	D10~D14	4007
7	R43 R45	2K	38	JD1	4100(DC9V)
8	R48	5.1K	39	D1~D9	4148
9	BG19	6.8-7.5V	40	IC8	5410AD
10	R38	6.8K*	41	IC9	7805
11	BG18	6V	42	BG1~BG15	9012
12	R28~R36	10	43	BG16	9013
13	R44 R46 R47	10	44	IC4	17358
14	U6	10LED	45	U1~U3	BS040
15	C22 C23	20	46	JP0	3CTZ
16	R37	27K*	47	JP6	COM1
17	C19	47u	48	JP4 JP9	COM2
18	IC6	74LS08	49	JP7	COM2
19	IC10	74LS174	50	JP1 JP8	COM3
20	R21~R26	100	51	JP2	COM3
21	C1~C17	104	52	JP3	COM4
22	C24 C25	104	53	JP5	COM4
23	IC2 IC3	138	54	U9	DC6V
24	IC1	164	55	LED1~LED7	FLED
25	R27	200	56	U8	FT
26	Rt	203AT	57	JD2	HLS-14F(DC9V)
27	R41	330	58	LED8	LED
28	R42	360	59	IC7	RS232
29	C18	470uf	60	SW1~SW8	TP801
30	W1	500	61	U7	XATL
31	R39 R40	510	62		

#### 14. After-sale service

Dear user:

Thanks for using the medical products made by our company, please keep this maintenance list properly. We guarantee to keep the machine in good repair or to maintain the machine by the right of this maintenance list for any flaw in quality or failure

#### Maintenance list

Product name: Infant warmer		Product model(specification): BN-100		
Date of leaving factory: Month		Year	Date of buying the machine: Year      Month	Number:
Applying department:			Postcode:	
Address:			Tel:	
Suggestions of applying department	Year Month (signature)			
Handling suggestion	Year Month (signature)			

We guarantee to keep all medical equipment products made by our company in good repair for two years and maintain them for all its lifetime (except man-made damage), if the product hasn't reached the technical standard or has other flaws in

quality, please mail this maintenance list to the After-sale Service Department of our company to get solution.

### 15. Follow-up

Dear users:

This instruction is suitable for installation、usage、cleanout and maintenance of the infant warmer of model BN-100 produced. Users must follow this instruction to use this product. Any product failure caused by nonstandard operation or incorrect maintenance operated by unprofessional will not share the three-guarantee services we offered.

All relevant staff must operate the machine after reading this instruction carefully, if still having some puzzles, please contact with local dealer or our company to get detailed information.

We stick hard to lasting stratagem, so, all information, data and diagrams in this instruction are according to the newest products. For improvement or other reasons, the description in this instruction may be a little bit different from practical situation, our company will keep the right to amend the instruction at any time, we are sorry that we are not able to tell you about every revision, for important revision we will inform you, please forgive.



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**SPA-BM/PROD-20. 07 Februari 2025. Rev04**